SAFETY DEVICE FOR FIREARMS

BACKGROUND OF THE INVENTION

The present invention relates to a safety mechanism for firearms. More particularly, the invention relates to an electronic system for selectively disabling a firearm.

The use of various devices to increase firearm safety is well known in the art. These mechanisms generally fall into two categories.

Firearm safety mechanisms are generally used to prevent the weapon from firing accidentally due to falling or unintentional operation of the trigger. These mechanisms are generally mounted in the interior of the firearm and are deactivated when the firearm is to be fired. Safety mechanisms suffer from the drawback in that the mechanism can be operated by anyone, including unauthorized individuals or children. Furthermore, many safety mechanisms can be dislodged if the firearm is impacted with sufficient force, sometimes resulting in an unintended and unexpected discharge of the firearm.

The second category of firearm safety device is the gun lock. Gun locks are typically used when the gun is in storage or is being transported. Gun locks are key operated and are usually mounted exteriorly of the firearm. Gun locks suffer from the drawback in that they tend to be very model specific. Gun locks also tend to be very complex thereby resulting in a higher probability of mechanical failure with repeated use. Both gun locks and safety mechanisms suffer from the drawback that if they are exteriorly mounted, they have to be carried around separately resulting in an inconvenience to the user. Another drawback associated with prior devices is that foreign matter can enter the mechanism causing the mechanism to jam rendering the firearm inoperative.

The primary drawback to prior art devices is that they are primarily mechanical devices and can be overcome using relatively simple means. Gun locks requiring keys can be picked, gun locks with combinations require the user to remember the combination. Few of the prior art devices take advantage of recent technological developments, especially electronics, in order to increase firearm safety. One of the prior art devices does take advantage of high tech electronics. These devices include a means for scanning a user's hand, grip pattern, or thumb print, storing it in a memory, and then releasing a locking mechanism when a microprocessors matches the user's hand or thumb print to that stored in memory. While these devices are conceptually sound, they do suffer from drawbacks or inadequacies.

It can first be noted that, as a practical matter, the first generation devices, i.e., those conceived prior to 1988, could not have worked. The size of the processor would not have permitted storage of sufficient data to facilitate the concept. Also, the miniature scanner technology was not known at the time.

Some of the later devices also suffer from problems. U.S. Pat. No. 5,603,179 discloses such a device. The device includes a scanner for scanning in fingerprints, and an associated mechanism for preventing operation of the hammer. First of all, the operation of the device is not clear, but appears to involve the use of a mechanism to physically block the hammer. This type of mechanism may work well with the power applied, but may fail when the power fails. No warning mechanism of any type is available to alert the user that power failure is imminent. Also, if the user applies sufficient force to overcome the locking mechanism, the gun will still fire. It will be apparent to the user that the locking mechanism causes hammer movement to be defeated, since the hammer will not cock. Thus the user will know exactly how to overcome the safety mechanism.

U.S. Pat. No. 4,970,819 discloses a firearm safety system which recognizes the grip pattern of a user, and deactivates a locking mechanism when a match is detected. The system suffers from the drawback in that grip patterns are not sufficiently unique and thus the firearm may be used by someone, other than the authorized user, who has a grip pattern simiilar to that of the authorized user. Also, as in the previous invention, the trigger cannot be actuated, thus making it apparent to the user that some type of locking mechanism is in place.

SUMMARY OF THE INVENTION

It is a major object of this invention to provide a safety device for a firearm which uses a microprocessor controlled locking mechanism.

It is another object of this invention to provide a safety device for firearms which is an integral part of the firearm and includes a fingerprint scanner for scanning and storing the fingerprint of a user.

It is yet another object of this invention to provide a safety device for a firearm which is primarily mounted within the interior of the firearm.

It is another object of this invention to provide a safety device which operates to defeat operation of the firearm when the fingerprint of the user does not match the stored fingerprint.

It is another object of this invention to provide a safety device for a firearm which does not contribute to jamming, or other unintended malfunction of the firing mechanism.

It is another object of this invention to provide a safety device which appears to cause the firearm to malfunction without making it apparent that a locking mechanism is in place.

It is another object of this invention to provide a battery operated safety device for firearms including a low battery warning mechanism.

It is yet another object of this invention to provide a safety device for firearms which can be adapted for use with different types and brands of firearms.

In accordance with the objects of this invention a safety device for firearms is provided. The device includes a scanner for scanning in a user's finger or thumb print, and a microprocessor for storing the data associated with the fingerprint. The microprocessor can also be programmed to store the name, address, phone number, and social security number of the user. The device also includes at least two indicator lamps to inform the user whether the system is armed or unarmed, and to provide an indication when the battery is low. A solenoid activated spring loaded mechanism defeats operation of the firing pin thus rendering the firearm inoperable. The mechanism is designed to make the firearm appear to malfunction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a partially broken away side view of a firearm with the device of the present invention installed.

FIG. **2** shows a plan view of the device separate from the firearm.

FIG. **3***a* shows a detail of the device shown in FIGS. **1** and **2**.

FIG. **3***b* shows a detail of the device shown in FIGS. **1** and **2**.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIGS. **1–3** the device of the present invention, generally indicated by the numeral **10**, is shown. The device **10** is essentially a disabling mechanism for a firearm **14** which operates by holding the firing pin **12** out of position to prevent firing of the firearm **14**. In the embodiment of FIG. **1**, the device is shown mounted on a handle **16** operable to be gripped by a user's hand. The device **10** is shown mounted in an automatic pistol, it can be appreciated by those skilled in the art that slight modifications might be required depending on the make and model of the firearm.

The device consists of three primary components; a scanner element **20** for scanning in the user's finger or thumb print, a microchip or microprocessor **22** for storing the user's finger or thumb print, and a spring loaded, solenoid activated, mechanism **24** for rendering the firing pin **12** inoperable. If desired, a tracking device such as Lo-Jack™ may be installed to track the firearm **14** in the event it is lost or stolen.

The scanner element **20** may be a charged coupled device of the type well known in the art. Of course, other scanner elements may be used without departing from the spirit and scope of the invention. The scanner **20** is activated in response to movement of the trigger **26**. Alternatively, the scanner **20** may be mounted upon a switch element which, when depressed, activates the scanner **20** which scans the finger or thumb print of the user and begins to send data to the microprocessor **22**. In order to save power, the microprocessor **22** may end the scan as soon as a match or non-match is certain. It can be readily appreciated that the scanner **20** and solenoid mechanism **24** will require the most power of all of the system components.

The microprocessor **22** may be any of several well known processors which can hold sufficient data to store data associated with at least two fingerprints. Preferably, the microprocessor **22** can store several fingerprints so that more than one user may operate the firearm **14**. The fingerprint data may be stored as a bitmap having sufficient resolution to distinguish between fingerprints. The microprocessor **22** outputs signals to the solenoid mechanism **24** for selective control thereof. The microprocessor **22** may simply act as a switch to pass current from the battery **28**. The program for comparing the fingerprints may be stored on ROM in the microprocessor's **22** memory area. In the preferred embodiment, the microprocessor **22** also stores the name, address, and social security number of the owner, as well as the serial number of the firearm **14**. The issue date and vendor identification may also be stored in the microprocessor **22**.

A port **30** is provided to allow for electronic interface between the microprocessor **22** and an external computer (not shown) which is used to program and reset the microprocessor **22**. Accordingly, the port **30** would be connected to both input and output pins (not shown) on the microprocessor **22**. The port **30** is adapted for connection to a standard jack (not shown) to facilitate connection to the computer. The port **30** would also include a connector to the battery **28** so that it may be recharged. Alternatively, the battery **28** may be a disposable alkaline battery allowing for maximum charge storage and immediate replacement when a low battery condition is sensed.

Indicator lights **29** and **31** provide an indication of the operational status of the device. Indicator light **29**, which may be a green LED, is activated if the system is armed. Indicator light **31**, which may be a red LED, is activated if the system is unarmed. A low battery condition may be indicated by both lights **29** and **31** blinking. The lights **29**, **31** may also be used to indicate when scanning is completed, or needs to be redone, e.g., by alternate blinking or some other predetermined pattern.

The solenoid mechanism **12** is selectively connected to AC power which is generated by converting battery power. A separate DC-AC converter may be used, or an oscillator may be built into the microprocessor **22**. The solenoid mechanism **12** includes a coil (not shown) which is contained within housing **32**. The coil is in close proximity to a permanent magnet (not shown) which is connected to a small post **36** which is mounted within housing **32** and can move vertically within housing **32**. The post **36** includes a radially extending stopper **39** which serves to limit the upward travel of the post **36**. The post **36** and magnet form a plunger arrangement **34** of the type of which is well known in the solenoid actuator art. The post **36** abuts and is biased by spring **37** so that when no power is applied to the plunger arrangement **34**, the post **36**, is not in position to block movement of the firing pin **12**. The spring **37** pulls the post **36** down and out of engagement with the firing pin **12** as shown in FIG. **3***b*. Thus the firearm **14** can be operated when there is no battery power. It should be noted that most prior art safety devices do not allow the weapon to be fired in the event of a power failure. While this may appear to be the safest approach, it actually has several drawbacks. First, once the battery is completely dead, there is no way to know whether the system has shutoff in the armed or disarmed condition. Secondly, in an emergency, even the intended user cannot use the firearm, a potentially extremely dangerous situation, especially for law enforcement professionals. Third, the system may malfunction and, if so, may continue to prevent operation of the firearm **14** even after power is no longer applied.

When battery power is applied, and the device **10** is armed, the plunger arrangement **34** pulls the post **36** up and into engagement with a recess **40** sized for secure locking engagement with the post **36** as shown in FIG. **3***a*. Preferably, the recess **40** is relatively shallow to reduce interference with the normal operation of the device. It is well known among gun enthusiasts that jamming can frequently occur with automatic weapons and that a frequent cause of the jamming is the firing pin. Thus, in accordance with the objectives of the present invention, the modifications in and around the firing pin **12** are minimized. It should be noted that the other components of the firing mechanism are deliberately not shown as the position and configuration of these components varies greatly from one manufacturer/model to another. The device **10** of the present invention is designed to disable only the firing pin **12** which has substantially the same configuration regardless of manufacturer/model. It can be readily appreciated that physical orientation and relative dimensions of the device **10** may vary from that shown, but such variance is considered within the spirit and scope of the invention as disclosed and claimed. Of course, it would not be desirable to have the device **10** positioned above the firing pin **12** since gravity will tend to push the post **36** down against the bias of spring **37** and into engagement with the firing pin **12**, potentially causing jamming or malfunction. Of course, the spring constant **37** should be made sufficiently strong to avoid this, and such a malfunction would only occur if the spring **37** were dislodged or damaged.

In order to accommodate the device **10** of the present invention, the handle **16** of the firearm may have to be enlarged. Of course, the size of the components is kept to a